World Trade Center - Code Compliance Evaluation

CONTENTS

1. PART I: ROLF JENSEN'S DRAFT REPORT - WORLD TRADE ISSUES

2. PART II: JAROS BAUM & BOLLES WTC DUE DILIGENCE STUDY

3. ATTACHMENT A: EXTRACT OF ROLF JENSEN'S FINDINGS

4. ATTACHMENT B: VENTING FIRE STAIRWAYS

5. COST SUMMARY

15 OCTOBER 1999

PART I

The "findings" listed in Rolf Jensen's report titled "Code Compliance Evaluation, World Trade Center Towers, New York, New York," dated 14 March 1997, and the issues raised by the World Trade Department, have all been identified as falling into one of the four category/groups shown below.

Please note that the origin of the following items is noted as **(RJ)**, **(ENG)**, or **(WTD)** for Rolf Jensen, Engineering, and the World Trade Departments respectively.

CATEGORY A:

NON-CONFORMING CODE ITEMS WHICH WILL REMAIN AS SUCH OR FOR WHICH NO PLANS WILL BE PREPARED TO ACCOMMODATE THE CODE

The Memorandum of Understanding (MOU) between the Port Authority and the New York City Department of Buildings, executed on 3 November 1993, and its two (2) supplements, were intended to have the Port Authority formally bound to the requirements of the New York City Building Code (the Code) for all projects to be constructed in New York City. The MOU stands mute on such construction preceding the Agreement's execution date. If interpreted liberally, this would relieve Items 1, 2, and 4, in this Category from having to meet the technical requirements of the Code. However, Item 3 in this Category has been an ongoing process, with additional electrical equipment being installed both before and after the MOU's execution. Analysis should be given to this topic.

1. **Exit Stair Discharge (RJ):** The **INTENT** of the Code requirement has been found to be fulfilled by Rolf Jensen interpreting the mezzanine of each tower to be an extension of the lobby. See Attachment A, Item 4.

If the stairs are brought to conformance with the **LETTER** of the Code in regard to discharge level, the cost for the four (4) stairs (two in each tower) would be an **order-of-magnitude** cost of **$10,000,000.**

2. **Exit Stair Shaft Smoke Vents (RJ):** At this writing, no plans have been prepared, or are scheduled for preparation, designed to meet either the **LETTER** or the **INTENT** of the Code. Attachment B, prepared by the Engineering Department seven years ago, provides an engineered solution, which will meet the **INTENT** of the code, but has not been implemented.

If the stairs are brought to conformance with the **LETTER** of the Code in regard to venting smoke, the proposed Engineering Department design noted above would have an **order-of-magnitude** cost of **$2,000,000.**

3. **Electric Closets (WTC):** There are a number of electric closets throughout the towers which are non-code compliant as a result of additional equipment installation without the prescribed clearances.

If the electric closets were brought to a code-conforming status, the **order-of-magnitude** cost would be **$8,000,000.**

4. **Electric Substations (WTC):** The substations are not code conforming. There are no specific plans to bring them to code conformance.

If the substations were to be brought to a code-conforming status, there would be an associated cost. The cost ($60,000,000) is referenced in Part II of this report, on page 2, item 1.a.

CATEGORY B:

NON-CONFORMING CODE ITEMS WHICH HAVE BEEN REMEDIED, OR ARE CURRENTLY IN PROGRESS

1. **Structural Fireproofing (RJ/WTC):** The structural steel fireproofing has been judged adequate by Rolf Jensen providing that all floors in both towers are sprinklered, including MER's and the Sky Lobbies; that the current sprinkler inspection program be continued; that sprinklering the towers' lobbies is not required provided that all booths in the lobbies be removed except for the Visitors' Desk and the Fire Command Center; and that the program for re-fireproofing of the structural steel to the appropriate thickness for a 2-hour rating be maintained. See Attachment A, Items 1 and 9.

For the removal and relocation of the lobby's booths, and for the ongoing, long term, structural steel fireproofing program, the respective **order-of-magnitude** costs are **$500,000** and **$18,000,000.**

2. **Tenant Separation Walls and Public Corridor Walls (RJ):** Remediating such walls to conform to code requirements is being accomplished under an ongoing, long term program. See Attachment A, Items 2 and 3.

The tenants are reimbursed by the Port Authority for such work executed under their contracts. At this writing, there are nó data available for order-of magnitude costs.

3. **Standpipe Telephone Jacks (RJ):** The code requirements have been addressed. See Attachment A, Item 7.

4. **Sprinkler Protection (RJ):** At this writing all tower floors have been sprinklered except for the sky lobbies which are currently having the sprinklers installed. See Attachment A, Items 1 and 9.

5. **Return Air Smoke Detectors (RJ):** The code requirement for such detectors has been addressed via the award of several contracts which are currently underway. There is also a program to continue the award of additional contracts to complete this requirement. See Attachment A, Item 10.

6. Return Air Smoke Detector Annunciation (RJ): This item has been addressed by the preparation of plans which will be implemented with Item 5, immediately above. See Attachment A, Item 11.

7. Elevator Lobby Smoke Detector Activation (RJ): This item has been addressed and will be installed following the completion of the Return Air Smoke Detectors (Item 5 above). See Attachment A, Item 12.

8. Manual Fire Alarm Station (RJ): This item has been addressed. See Attachment A, Item 13.

9. Public Address Loudspeakers (RJ): This item has been partially addressed with the installation of loudspeakers in the public corridors of the towers' floors. The requirement for the remaining speakers has been addressed via a program which has been started.. See Attachment A, Item 14.

Relief from this requirement may be available from the New York City Buildings Department by demonstrating that all areas within tenant spaces will hear the loudspeakers already installed in the public corridors. (This comment is by the writer.)

10. Fire Command Stations(RJ): These code requirements have been satisfied. See Attachment A, Item 15.

11. Asbestos Containing Material (ACM) (WTD): Abatement in elevator shafts containing ACM has been an ongoing program for several years, and will continue until abatement is complete.

At this writing, an investigation is underway to determine whether or not other shafts contain ACM and therefore will also require abatement. **No cost data is currently available.**

CATEGORY C:

NON-CONFORMING CODE ITEMS WHOSE REMEDIATION PLANS ARE CURRENTLY BEING PREPARED AND/OR WILL BE PREPARED IN THE NEAR FUTURE.

1. Exit Enclosures (RJ): Several mechanical rooms are entered from and exit out to the fire stair shaft causing a code non-conformance. The intent of the code requirements for exit stair enclosures can be more closely conformed with by the installation of "vestibule" areas with smoke-tight doors for each such mechanical equipment room.. See Attachment A, Item 5.

At an **order-of-magnitude of $75,000 each** for all of the World Trade Center's mechanical rooms which exit onto fire stairs the total cost is **$600,000**.

2. Standpipe Hose Stations (RJ): The World Trade Department should implement a survey to determine which floors have inadequate fire hose reach, and establish a plan to have these floors become code-conforming. Additionally, New York City Fire Department approval should be sought for those fire hoses exceeding the maximum length as stipulated by the Code. See Attachment A, Item 6.

The survey noted above could discover a significant number of required additional standpipes in tenant areas which are beyond the reach of the existing fire hoses.

3. RF Emissions (WTD): Plans to meet the FCC and OSHA requirements are currently being studied should new antennae be installed on the roof of 1 World Trade Center. The proposed solution stemming from the aforesaid studies will be implemented if installation occurs. See Attachment C. The dollar impact is currently indeterminate.

4. Lead Abatement (WTD): Irrespective of any antenna installation, the lead on the "crown" structural framing immediately below the roofs of both towers, will be abated per the requirements of the New York City Building Code.

The **order-of-magnitude** cost is **$500,000.**

5. Mall Egress (WTD/ENG): An engineered solution for the various non-conforming code issues, including egress, was prepared jointly in 1992 by the World Trade and Engineering Departments. Partial completion has been accomplished at this writing. Still to be completed are additional exits to the exterior, a smoke purge system, and a signage system.

The **order-of-magnitude** cost is **$25,000,000 to $40,000,000.**

6. Lobby Carpeting (WTD): The carpeting in the World Trade Center lobbies does not meet the test requirements prescribed by the New York City Building Code. A plan is currently in progress to replace the carpeting with a non-flammable material.

Alternate flooring materials are stone or replacement carpeting.. The respective **order-of-magnitude** costs are **$3,000,000** and **$500,000.**

7. Elevator Runby (WTD): 5 World Trade Center, Elevator Cars 7 through 9, have run by problems.. Preliminary studies have been prepared but not yet implemented. **Order-of-magnitude** costs are **$1,000,000** to **$2,000,000.**

8. Subgrade B-1 Level/Truck Dock (WTD): The following items represent several of the major items that will have to be addressed. There are others of a more minor nature.

a. Egress stairs and elevators must have properly sized or ventilated vestibules.

b. A significant portion of the floor area falls beyond the maximum permissible travel distance to an exit stair.

c. The separation between the truck dock and adjacent areas do not all have the required 3-hour, horizontal and vertical construction separations. This includes penetrations in the existing walls by doors, ducts, etc.

d. A significant portion of the structural steel floor framing has inadequate fireproofing.

e. An upgrade of the entire area's smoke exhaust and ventilation capacity is required .

Order-of magnitude costs are **$25,000,000** to **$50,000,000**.

CATEGORY D:

ITEMS OF POLICY, BUSINESS LEASES, REPAIR , AND OPERATIONS

1. **Roof Antennae (WTD):** Require unusual maintenance.

2. **Facade (WTD):** The World Trade Center buildings all are subject to cyclical maintenance, This meets the Building Code requirements.

3. **Steam Piping (WTD):** The adequacy of certain steam pipe welds is questionable. An existing bi-weekly inspection of the system, including such welds is conducted. Such inspections meet the Building Code requirements.

Order-of-magnitude costs are **$40,000.**

4. **Low Chilled Water System (WTD):** Recommend statistical sampling of appropriate systems to determine corrosion areas .

Order-of-magnitude cost of **$1,000,000.**

5. **Slurry Wall (WTD):** A program is ongoing which surveys the slurry wall for leaks, cracks, thickness reduction, etc.

Order-of-magnitude cost is **$50,000 per year.**

6. **Parking and Truck Dock Slabs (WTD):** Significant areas of both the parking and truck dock slabs are in a deteriorated condition. A remediation program is currently in progress.

A portion of this program has been completed. However, the remaining areas requiring similar work will have an **order-of-magnitude** cost of **$40,000,000.**

7. **Freeze Protection (WTD/ENG):** Currently the supply fans for the air-conditioning fans are not freeze-protected; the coils are mechanically cleared each year. It is anticipated that a plan to provide such protection will be implemented.

The **order-of-magnitude** cost is **$3,000,000.**

8. **Certificate to Operate Generator (CTO) Plants (WTD):** The placement of responsibility for filing for and attaining such permits to operate must be addressed, as well as who retains overall responsibility to operate. Currently, a request for this permit has been made by the Port Authority (WTD), but has not been received.

9. **Discharge Monitoring Report (WTD):** The placement of responsibility must be addressed regarding filing for and attaining permits for discharges into the Hudson River of the heated water from the World Trade Center's air-conditioning systems. Retention of overall responsibility must also be addressed.

10. **Central Refrigeration Plant (WTD):** This plant currently uses refrigerant R-22, which will only be available for the next 10 to 15 years. Because this coincides with the end of the plant's life-cycle, replacement will be required at that time.

11. Mall Escalators (WTD): Major service and extraordinary repair are required for the BMT and Liberty Street escalators.

Order-of-magnitude costs are **$1,200,000.**

12. PATH Mezzanine Emergency Smoke Control: A Stage III design is currently in progress. It will prevent smoke generated at the train level from reaching the Mall level thereby fulfilling one of the requirements of the Mall Life Safety study completed in 1992 by the Engineering and World Trade Departments.

This not a World Trade Center issue.

13. PATH (WTD): There is no flood control method for the PATH tunnels. A flood could submerge the B2 through B-6 levels.

14. Code Conformance (WTD): Responsibility for overseeing conformance to Code must be addressed for both WTC base building and Tenant projects.

15. Certificate of Occupancy(CO) (WTD): No certificate exists.

15 OCTOBER 1999

PART II

JAROS, BAUM & BOLLES
WORLD TRADE CENTER DUE DILIGENCE STUDY: 22 NOVEMBER 1996

The items listed below are extracted from the title study as a result of their having been identified as "Standard Compliance Issues," "New York City Building Requirements," "Requirements in the City of New York," or are otherwise noted as current industry practice in New York City and/or State. Note that all item numbering and page references in this report are exactly as they appear in the JB&B study.

Each item has been further identified as falling into one of the following three (3) categories:

A. NON-CONFORMING CODE ITEMS WHICH WILL REMAIN AS SUCH OR FOR WHICH NO PLANS WILL BE PREPARED TO ACCOMMODATE THE CODE.

B. NON-CONFORMING CODE ITEMS WHICH HAVE BEEN REMEDIED, OR ARE CURRENTLY IN THE PROCESS OF BEING REMEDIED.

C. NON-CONFORMING CODE ITEMS WHOSE REMEDIATION PLANS ARE CURRENTLY BEING PREPARED AND/OR WILL BE PREPARED IN THE NEAR FUTURE.

TOWER 1 and TOWER 2 - ABOVE-GRADE LEVELS

General Note: Installation of fire stopping material for **the entire complex** is an **order-of-magnitude** cost of **$1,900,000. Category C.**

Heating, Ventilating, and Air Conditioning:

Standard Compliance Issues:

1.b. Confirm adequacy of fire stopping at duct/pipe penetrations. (See JB&B Study, page 5). **Category C.** The cost is included in the General Note above.

System Upgrades:

4. c. Install smoke dampers in the discharge of all air-conditioning systems over 15,000 cfm. Duct smoke detector sequence of operation should activate the new discharge dampers along with the existing return and outside air dampers. Dampers should close upon activation in accordance with New York City Building Requirements. (See JB&B Study, page 7.) **Category C.**

Note that the Port Authority does not agree with JB&B in regard to their assessment of this item. The system components in question are seen by the PA as an engineered system that meets the intent of the Code.

However, if the modification were to be made, the **order-of-magnitude** cost would be **$2,400,000.**

Steam Distribution System:

1. a. Ensure that all pressure relief valves and safety shut-off valves are in place and fully functional. (See the JB&B Study, page 14.) **Category B.** The **order-of-magnitude** cost would be **$720,000.**

Transformation and Secondary Distribution System:

Standards Compliance Issues:

(See the JB&B Study, page 24 for the following four (4) items.)

1. a. Re-configure each service/distribution switchboard so that there will be a space of twelve (12) inches minimum between the section housing the service switches and the distribution section or apply for a ruling by the New York City Electrical Review Board. **Category A.**

The Port Authority does not agree with JB&B's conclusion. We believe that this is not a service switch and therefore is not a code requirement.

If it were physically possible to modify the substations' to meet JB&B's requirement, the **order-of-magnitude** cost, at $6,000,000 per substation, would be **$60,000,000.** This includes Item 1.d. below.

1. b. All aluminum cable terminations must be compression type to comply with current accepted industry standards for installations in the City of New York. In all cases where AL-CU mechanical type lugs are installed, they must be replaced with compression type. **Category B.**

Note that the World Trade Center Plant and Structures Division, on a regular and routine basis, inspects these electrical hardware items and repairs and/or replaces them on an as needed basis. This meets the intent of the code. This also applies to Items 1.b. (page 3) and 1 (page 3) of this report.

1. c. Install approved firestopping material in all floor openings through which bus ducts pass. **Category C.** See the General Note above. The **order-of-magnitude** cost for this item is included in the General Note on page 1 of this report.

1. d. The walls of the Substation Rooms should be relocated to obtain the required clearance. **Category A.** See the General Note above. The **order-of-magnitude** cost is included in item 1.a., immediately above.

Sprinklers:

Standard Compliance Issues:

1. a. Check all fire protection alarms for proper system annunciation. (See page 38 of the JB&B Study.) **Category C.**

SOUTHEAST PLAZA BUILDING (NUMBER 4) AND NORTHEAST PLAZA BUILDING (NUMBER 5)

Heating, Ventilating, and Air Conditioning:

Standard Compliance Issues:

1. a. Install smoke dampers on discharges. (See the JB&B Study, page 47.)

Note that the Port Authority does not agree with JB&B in their assessment of this item. The system components in question are seen by the PA as an engineered system that meets the intent of the Code.

However, if the JB&B finding were to be implemented, the **order-of-magnitude** cost would be **$800,000.**

Steam Distribution System:

Standards Compliance Issues:

1. a. Ensure that all pressure relief valves and safety shutoff valves are in place and fully functional. (See the JB&B Study, page 49.) **Category B.** The **order-of-magnitude** cost for this item is **$400,000**.

Electrical:

Transformation and Secondary Distribution System::

Subgrade Switchboard Room:

General:

1. a. Firestopping material has not been installed in selected floor and wall openings (See the JB&B Study, page 53.) **Category C.** The cost for this item is included in the General Note on page 1 of this report.

1. b. Two types of cable termination devices are installed: 1) AL-CU mechanical lugs and 2) compression lugs. The AL-CU mechanical lugs are not in accordance with current industry standards for aluminum conductors in the City of New York. (See the JB&B Study, page 53.) **Category A.** See Item 1.b., page 2. of this report.

Recommendations:

2. Install approved firestopping material in all openings through which conduits pass. See the JB&B Study, page 53.) **Category C.** The cost for this item has been included in the General Note on page 1 of this report.

Electric Closets:

Recommendations:

1. All aluminum cable terminations must be compression type to comply with the current industry standards for the installation of aluminum conductors in the City of New York. In all cases where AL-CU mechanical type lugs are installed, they must be replaced with compression type. (See the JB&B Study, page 54.) **Category A.** See Item 1.b., page 2 of this report.

2. Install approved firestopping material in all openings through which conduits pass. (See the JB&B Study, page 54.) **Category C. The order-of-magnitude** cost for this item is included in the General Note on page 1 of this report.

Low Voltage Distribution:

General:

1. k. The main circuit breaker unit for each 277/480 volt distribution switchboard, SPREE, SPEC, SPIEL, SPANIEL, SPANK,. and SPANNER fed from the spot network, are service switches and have been installed close-coupled to the feeder section of the switchboard which does not meet the requirements for electrical installations in New York. Also, switches in the distribution section located in the first compartment for elevators, fire pumps, etc., are also service switches and should not be installed within the feeder section of the switchboard. See page 59. **Category C.**

The Port Authority does not agree with JB&B's conclusion. The PA believes that it is not a service switch and therefore is not a Code requirement.

However, if they were to be changed, the **order-of-magnitude** cost, at $1,000,000 each, would be **$5,000,000.**

Specific:

b. 1. The rear of the switchboard SPNER (Northeast Plaza Substation Room) behind the main device section and the adjacent section is blocked by a column so that there is no access to the switchboard for maintenance. This does not meet the clearance requirements from the live parts in the switchboard for installation in the City of New York. **Category A.**

If this change was made, the **order-of-magnitude** cost would be **$2,000,000.**

d. 4. The last section of Switchboard SPSER (Southeast Plaza Substation Room) has been installed such that the rear compartments are within 2 feet of the wall to the stair landing. There is inadequate clearance to the live parts of the switchboard for installation in the City of New York. **Category A.**

If this change was made, the **order-of-magnitude** cost would be **$2,000,000.**

f. 4. The new 1600 ampere bolted pressure switch has been installed in the rear of the last section of the switchboard, blocking the rear access to the boards, the bus connections and the load lugs. The rear access to the 1600 ampere switch is also blocked by the existing board. This does not meet the clearance requirements for installations in the City of New York. **Category A.**

If this change was made, **the order-of-magnitude** cost would be **$2,000,000.**

Standards Compliance Issues:

The following nine items (1a through 1i) are listed on pages 62 and 63.

1. a. Disconnect existing main circuit breaker and bus connection from feeder section and relocate to provide 12 inches of space between the main device and the switchboard as required for electrical installations in New York City. Where additional devices, such as fire pumps or elevators switches which are tapped ahead of the 5,000 ampere main device, are located in adjacent upper compartments of the feeder section of the switchboard, remove those switches from the switchboard and mount separately with feeder taps and reconnect the load feeders. **Category A.**

The Port Authority does not agree with JB&B's conclusion. We believe that this is not a service switch and therefore is not a Code requirement.

If this change was to be made, the **order-of-magnitude** cost would be **$250,000.**

Items 1.b through 1.i following all pertain to low-voltage distribution which the WTD should address. They are all **CATEGORY C.**

1. b. Replace switches on Switchboard SPNER. The **order-of-magnitude** cost is **$250,000.**

1. c. Switchboard SPANK must be replaced with a new board requiring only front access. The **order-of-magnitude** cost is **$250,000.**

1. d. Replace switches on Switchboard SPANK The **order-of-magnitude** cost is **$250,000.**

1. e. Replace switches on Switchboard SPANIEL. The **order-of-magnitude** cost is **$250,000.**

1. f. Replace switches on Switchboard SPREE. The **order-of-magnitude** cost is **$250,000.**

1. g. Replace the last section of Switchboard SPREE with a unit that requires only front access. The **order-of-magnitude** cost is **$350,000.**

1. h. Replace switches in Switchboard SPEC. The **order-of-magnitude** cost is **$250,000.**

1. i. Disconnect the neutral at each end of the feeder in Distribution Panel HP-EM and mark the panels at each end as three-phase, three-wire panels.

CONCOURSE AND SUBGRADE LEVELS

Heating, Ventilating, and Air Conditioning:

Steam Pressure Reducing Stations:

Standards Compliance Issues:

1. a. Ensure that all required pressure relief valves and safety shutoff valves are in place and fully functional.)See the JB&B Study, page 86.) **Category B.** The **order-of-magnitude** cost for this item is **$120,000.**

Electrical:

High Voltage Distribution System:

Standards Compliance Issues:

1. a. Replace terminations in starter and re-terminate cable. (See the JB&B Study, page 91.) **Category B.**

Low Voltage Distribution:

General:

1. k. The main circuit breaker unit for each 277/480 volt distribution Switchboards SPAR, PAL, SPAR, and SPELL are fed from the spot network and are in fact service switches and have been installed close coupled to the feeder section of the switchboard, which is not in accordance with current industry standards for the City of New York. (See the JB&B Study, page 95.)

The Port Authority does not agree with JB&B's conclusion. We believe that these items are not service switches, and therefore are not code requirements.

Specific Observations:

c. 2. Feeder LCAR-7 is a 600 amp switch with 600 amp fuses. The feeder cable is 500 MCM terminated with compression lugs. There is a smaller set of cables double-lugged on the switch terminals that extend outside the Substation Room. These cables are a feeder tap which does not comply with current standards for installations in the City of New York. (See the JB&B Study, page 96.) **Category A.**

If this change was made, the **order-of-magnitude** cost would be **$1,500.**

m. 2. ERP-1E: (This is for the Concourse level electric closet opposite the Cambridge Members Store.) Clearance in front of the live parts of this panel from DP-LIP is not sufficient to comply with industry standards for installations in the City of New York. (See the JB&B Study, page 99.) **Category A.**

If this change was made, the **order-of-magnitude** cost would be **$10,000.**

o. 1. (For Concourse Electric Panel Area in stair at Chase Bank.) There is a transformer trapeze mounted in the stair from the B1 Level corridor. Location of the transformer in the stair is not an acceptable installation in the City of New York. (See the JB&B Study, page 100.) **Category A.**

If this change was to be made, the **order-of-magnitude** cost would be **$7,500.**

p. 1. (For Concourse level electric closet behind Express Shop.) A 75 KVA transformer is installed in the floor without industry accepted clearance to the terminal compartments for installations in the City of New York. (See the JB&B Study, page 100.) **Category A.**

If this change was to be made, the **order-of-magnitude** cost would be **$6,000.**

s. 1. (For the B! level electric closet.) Panel LP-H is a custom made panel that is extremely tall. The main switch device is higher than 6 feet - 6 inches from the floor. This does not comply with industry standards for the City of New York. The panel is fed with aluminum cable terminated on the mechanical lugs of the main switch device. (See the JB&B Study, page 101.) **Category A.**

If this change was to be made, the **order-of-magnitude** cost would be **$6,000.**

t. 1. (For B1 Level Tower B, electric closet in Dean Witter area.) Panel LPWA-SLW: There is a feeder that runs throughout the panel and is gutter taped once to feed the panel and twice more to feed adjacent fused switches. One of these taps is a three-conductor tap to the line side of a meter. On the load side of the meter, six conductors are extended from the meter terminal to 60-ampere disconnect switches, using one of the switches as a junction box. This installation does not comply with industry standards for installations in the City of New York. The cover is also missing from this panel. (See the JB&B Study, page 101.) **Category A.**

The Port Authority does not agree with JB&B's conclusion. This is not a service switch, and therefore there are no Code requirements.

General:

Specific Recommendations:

a. 1.(For Switchboard SPAR) Install a new switch for the fire pump sized to comply with industry standards for the City of New York and tap the switchboard bus ahead of the main switch. Paint switch red. (See the JB&B Study, page 103.) **Category B.**

The **order-of-magnitude** cost is **$50,000**.

c. 3. (For Load Center LCAR) Reconnect to a bus tap and reroute feeder through a fused switch before leaving the Substation Room to comply with industry standards for installations in the City of New York. (See the JB&B Study, page 103.) **Category A.**

The **order-of-magnitude** cost is **$50,000.**

e. 2. (For Panel EDP-SLA) Remove double tap on breaker and install feeder tap on power with fused switches to comply with industry standards for installations in the City of New York. (See the JB&B Study, page 104.) **Category A.**

The **order-of-magnitude** cost is **$25,000.**

t. 1. (For B1 Level, Tower B, Electric Closet in Dean Witter Area) Remove feeder tap to meter. Relocate meter and install a new fused switch on line side of meter and make feeder in accordance with New York City industry standards. Install a trough on the meter load side with three conductors from meter and tap in trough to feed the existing 60 ampere switches to comply with New York City industry standards. (See the JB&B Study, page 106.) **Category A.**

The **order-of-magnitude** cost is **$25,000.**

Domestic Cold Water System:

Recommendations:

Standards Compliance Issues:

2. b. Modify the domestic water service and provide Reduced Pressure Zone (RPZ) backflow preventers approved for use in New York City. Prior to installation, a study must be performed to determine the impact of RPZ valves on the system. (See the JB&B Study, page 110.) **Category C.** The **order-of-magnitude** cost is **$200,000.**

Fire Standpipe Systems:

Observations:

3. In several locations, riser control valves are not accessible in accordance with Reference Standard 17.1 (c) Valves, Paragraph (5). (See the JB&B Study, page 112.) **Category C.** The **order-of-magnitude cost** is **$100,000**.

1. b. Where riser control or section valves are located outside stair enclosure, install remotely controlled motorized valve operators at each sectionalizing valve on the Concourse and B-1 Level. The remote control shall be from either the Entrance Floor or from the Fire Pump Room. (See the JB&B Study, page 113.) **Category C.** The **order-of-magnitude** cost is **$200,000.**

Sprinkler Systems:

Standards Compliance Issues:

1. a. We recommend that all Subgrade Levels and the public area of the Concourse Level be provided with automatic sprinkler protection throughout, including mechanical rooms, toilet rooms, etc. (See the JB&B Study, page 114) **Category B.** The **order-of-magnitude** cost is **$150,000.**

1. b. Where riser control or sections valves are located outside stair enclosure, install remotely controlled motorized valve operators at each sectionalizing valve on the Concourse and B-1 Level. The remote control shall be from either the Entrance Floor or from the Fire Pump Room. (See the JB&B Study, page 115.) **Category C. The order-of-magnitude** cost is **$250,000.**

ATTACHMENT A

Mr. Eric H. Coty, P.E., of Rolf Jensen's staff prepared and signed the document (Section 5.0) whose entire contents have been transcribed verbatim from the Rolf Jensen report titled Code Compliance Evaluation, World Trade Center Towers, dated 14 March 1997. Specific recommendations made by Mr. Coty are shown in bold face. Additional, informational comments, provided in this writing are shown in italics.

Section 5.0 - Evaluation

5.1 - General

This code compliance evaluation involves a comparison of previously described fire protection and life safety features with the requirements of the applicable Codes listed on page 3 *(of this report)* and as outlined in Appendix B *(of this report)*. Code compliance is evaluated at the time of original construction and at the time of the February 26, 1993 explosion. The evaluation takes into consideration fire protection and life safety improvements which have been planned or completed since 1993.

5.2 - Findings

Structural fireproofing

1. Based on the results of our evaluation of the sprinkler systems in the World Trade Center Towers, we find that they are capable of controlling the expected light hazard fire size and intensity. It is our opinion that the protection provided by the automatic sprinkler systems will mitigate the fact that the Towers' structural steel fireproofing fall somewhat short of that required to provide a 2-hour fire resistance rating. This opinion is based on the following qualifications:

    a. **That all floors in the Towers, including MER's and Sky Lobbies, will be sprinklered in conformance with the New York City Building Code and NFPA 13. However, taking into account the 24 hour a day manning of the now existing Lobbies' Fire Command Centers, the soon to be installed total video surveillance system, and the near term removal of the airlines and other similar booths, the sprinkler plan may exclude the 310 level of both Towers. There will be no other permanent or temporary uses within the lobby other than the Fire Command Centers, and the proposed Visitors' desks (steel frames with marble fronts and composite/laminate tops).**

    b. **That the Port Authority continue its current programs and implement additional programs as necessary to ensure the inspection, testing and maintenance procedures of and for the sprinkler systems and the components, which include but are not limited to the water supply, fire pumps, gravity tanks, piping, valving, etc. These programs should be designed to meet the intent of NFPA 25.**

    Further, when the procedure is underway for testing the system's water flow and alarm transmission, the specific system pressure will be indicated at the gage downstream of the valve. This will be recorded at the time of the system test and will indicate the proper operation of the valve by matching the designed pressure reduction.

c. **That when tenanted are vacated in part or in full, it is our understanding that the Port Authority has been currently been installing, and will continue to install 1 1/2- inch thick steel fireproofing based on UL Design No. G508.**

Also, see Item 9, below.

Tenant Separation Walls

2. Tenant demising partitions, including separations from the public corridor, do not in all cases meet the requirement of being built to the slab above.

Generally, this condition has been and will continue to be remediated as a requirement of new Tenant alterations. However, it is recommended that the Port Authority develop and implement a survey program to assure that this remediation process occurs as quickly as possible.

Public Corridor Walls

3. **(See Item 2 above, which includes demising partitions between Tenant and Public spaces.)**

Stair Discharge

4. Stairs A and C discharge through a common service corridor at the 2nd floor which leads to the mezzanine and then to discharge doors to the plaza outside. Stair B discharges through a service (elevator) lobby to the 1st floor "main" lobby. This arrangement causes the service lobby to be considered as part of the street floor lobby.

Requirements for such "internal" stairs include: the necessity to discharge directly to a street floor lobby or an exit passageway leading to the outside; that a maximum of 50% of these stairs are permitted to discharge through a single exitway passageway; and that all vertical exits are permitted to discharge through a street floor lobby provided two different paths are available to open exterior spaces.

These outstanding requirements are mitigated to a significant extent by considering the mezzanines of both towers as leading directly to an outside street, in this case, the World Center Plaza. This consideration is further supported by both towers being fully sprinklered (see Item 1 above).

Exit Enclosures

5. Exit stairs are required to be free of any doors not providing access for the building's office population's exiting purposes. This requirement is not fully conformed with as existing doors access the exit stairs from the air conditioning plenums/fan rooms, and an electric closet on floors 48, 82, and 76, respectively.

The intent of this requirement, can be mitigated by installing a "vestibule" area on the inside of these rooms, and having all doors specified as smoke-tight, fire proof, and self-closing.

Standpipe Hose Stations

6. Several standpipe and auxiliary hose stations do not provide coverage of all portions of all floor areas within the required 145 feet of any given hose's effective reach. Further, some hose racks are equipped with 150 feet of hose in lieu of the standard 125 feet, and provide coverage for 170 feet.

It is recommended that the Port Authority establish a program to survey all tenanted floors to identify areas inadequately covered, and to remediate such inadequacies as quickly as possible.

Also, it is recommended that approval be obtained from the New York City Fire Department for the existing 150 foot long hoses.

Standpipe Telephone Jacks

7. **The requirement that permanent telephone jacks be installed on each floor near standpipe risers has been addressed.** Permanent standpipe telephone jacks have been installed and activated on each floor level of all fire stairways in both towers.

Smoke Vents

8. All closed shafts having a cross-section area exceeding four (4) square feet are required to be equipped with a smoke vent. Although the return air shafts currently have the means to exhaust smoke-laden air directly to the outside by mechanical means, **it is recommended that the Port Authority investigate methods by which this overall requirement maybe satisfied.**

Sprinkler Protection

9. Of At this writing, only four (4) tenanted floors (all in 1 WTC) have not been sprinklered. those floors, the sprinklerization of floors 17, 30, and 33 will be completed by the end of this year (*1997*).

Additionally, as referenced in Item ! above, plans will be made to sprinkler the MER's and the skylobbies in both towers.

All four (4) floors noted above (floor 19 was not mentioned by Mr. Coty of Rolf Jensen) have been completed at this time. Also, the Sky Lobbies sprinklerization are currently underway.

Return Air Smoke Detectors

10. Although smoke detectors or combination smoke/heat detectors are required at each inlet to a return air shaft on each floor, our survey indicated that such detectors may not have been installed at all required locations.

This has been addressed via a Port Authority contract which will be handling new, addressable smoke detectors at each return air intake above the suspended ceilings beginning July 1997 and completed by December 1999.

A program to address this item has started. Several contracts have been awarded, covering approximately 45 floors, and installation is currently underway. The balance of the program will continue without interruption, and should be complete by mid-2000.

Return Air Smoke Detector Annunciation

11. Return air smoke detectors on each floor are required to: automatically shut down all supply and return air-fans serving the "fire-floor" (or close dampers); to sound an alarm on the "fire-floor" and the floor above; to transmit an alarm signal to the Fire Department via a control station; and to enunciate at the Command Center, the Mechanical Control Center, and the regularly assigned location of the Fire Safety Director.

    This has been addressed via the Port Authority contract noted in Item 10 above.

    Device upgrade plans are being prepared to address this item. Implementation will begin as the contracts noted in item 10 above are completed. Completion is projected at the third quarter of 2000.

Elevator Lobby Smoke Detector Activation.

12. Elevator lobby smoke detector requirements will be addressed and satisfied by the PA contract noted in Item 10 above.

    The remaining public address loudspeakers and strobes will be installed following the completion of item 10 above.

Manual Fire Alarm Station

13. **Requirements for manual fire alarm break-glass stations have been addressed and satisfied via the installation of manual stations on all floors and in location and quantity so that no point on any floor is more than 200 feet from the nearest station.**

Public Address Loudspeakers

14. Loud speaker requirements regarding location and therefore audibility have been partially addressed with installation of such loudspeakers in public corridors within 10 feet of each exit.

Fire Command Stations

15. Fire Command Stations are required to be located in the lobby of each building on the entrance floor as part of the elevator control panel or immediately adjacent thereto.

    These requirements have been satisfied by the installation of the required station in the lobbies of WTC 1 and WTC 2, which are currently operational.

ATTACHMENT B

THE PORT AUTHORITY OF NY & NJ

M E M O R A N D U M

TO: K. King

FROM: R. Greenberg

DATE: October 23, 1991

SUBJECT: CONCEPT STUDY – VENTING OF STAIRWAYS A B & C IN WTC TOWERS 1 & 2

COPY TO: A. Brociner, P. Sweeney, S. Wiener

In accordance with your request, attached please find the subject study. The conclusions are as follovs.

Although stairway venting is a code requirement it is our interpretation that stair venting serves as an after the fact housekeeping smoke purge function rather than one of life safety for the following reasons.

- Fully sprinklered buildings minimize smoke conditions in stairways during a fire condition. For the purpose of the subject study, as per your direction, the WTC facility is treated as a fully sprinklered building since it is nearing completion of its full sprinklerization program.

- During a fire condition the stairway venting system could not operate simultaneously vith the primary existing smoke purge system. Therefore the stairway venting system vould mostly operate as an after the fact housekeeping function.

The proposed concept as indicated is SK-2 for the stairway venting system consists of supply fans at the 7th floor MER's and exhaust fans vith otorized dampers in conjunction vith a fusible link at the 108 MER's.

The design was premised upon removing existing doors within the stairway as per your direction. However to date there appears to be no clear resolution between the Arch. and Q.A. groups on this issue.

Order of magnitude construction cost estimates for both towers for the proposed concept design is approximately 1.3 million.

Project implementation is approximately 2.0 years for preliminary/final design and construction.

Next Steps

It is recommended that engineering retain a Consultant with stair venting expertise to provide a second opinion concerning our interpretation of the life safety and housekeeping issues.

Preliminary design is required to develop routing of make-up air ducts at 7th floor and exhaust air ducts at 107th and 108th floors so as to minimize disturbance to existing base building services and to existing tenant spaces.

If there are any questions, or points requiring further clarification, please contact Bob Greenberg at 435-8868.

Bob

Robert Greenberg

ATTACHMENT C

COST SUMMARY

	CATEGORY A $	CATEGORY B (1) $	CATEGORY C (2) $	CATEGORY D $	TOTALS $
PART I	20,000,000	18,000,000	51,000,000 to 96,100,000	45,000,000	134,290,000 to 179,390,000
PART II	66,381,000	1,320,000	10,420,000	N/A	78,121,000
TOTALS	86,381,000	19,320,000	61,420,000 to 106,520,000	45,000,000	212,411,000 to 257,511,000

NOTES:

(1). IN CATEGORY B THERE ARE NO COST DATA AVAILABLE FOR PARTITIONS SEPARATING ONE TENANT FROM ANOTHER, OR SEPARATING A TENANT FROM A PUBLIC CORRIDOR.
(2). CATEGORY C CONTAINS $50,000 PER YEAR FOR SLURRY WALL REPAIR.

DEFINITIONS:

Category A: Non-conforming code items which will remain as such or for which no plans will be prepared to accommodate the Code.
Category B: Non-conforming Code items which have been remedied, or are currently in progress.
Category C: Non-conforming Code items whose remediation plans are currently being prepared and/or will be prepared in the near future.
Category D: Items of policy, business leases, repair, and operations.

WTC12.XLS

THE PORT AUTHORITY OF NY & NJ

One World Trade Center
New York, N.Y. 10048

Richard C. Leone
Chairman

(212) 435-4173
(201) 961-6600 x4173

ATTACHMENT D

March 19, 1993

Honorable Carlos M. Rivera
Fire Commissioner
City of New York
250 Livingston Street
Brooklyn, NY 11201

Dear Carlos:

Thank you again for all of your assistance, and the efforts of all of New York's Bravest, in assisting the Port Authority to address the explosion and fire at the World Trade Center on February 26, 1993 and its aftermath. The dedication and professionalism of the Fire Department are deeply appreciated by all of us at the Port Authority, and all who were affected by the events of that day.

Although the events of February 26 were truly extraordinary, there was nothing out of the ordinary in the high level of cooperation between our two agencies. Our agencies have cooperated in the past in responding to other emergencies, at our New York airports and other facilities. Our agencies have also cooperated in the less conspicuous, but equally important, day-to-day efforts of maintaining Port Authority facilities as safe places to work in and visit.

The continuing spirit of cooperation between the Port Authority and the Fire Department is embodied in long-standing Port Authority policies to conform with New York City fire code requirements, and in protocols between the Port Authority and the Fire Department. Consistent with the philosophy of these policies and protocols, all Port Authority facilities in the City of New York have been available for inspection by the Fire Department.

As we discussed, we will be submitting a resolution to the April 15 meeting of the Board of Commissioners under which the Port Authority would voluntarily agree to implement all findings for the improvement of safety systems and procedures made by the Fire Department based on such inspections. In addition, any safety systems to be introduced or added to the World Trade Center will first be reviewed with the Fire Department.

We are convinced that through such continuing cooperation we can best serve out joint interest in protecting the health and

safety of those who work in and visit Port Authority facilities located in the City of New York.

Again, thank you for all of your assistance and the efforts of the entire Fire Department.

Sincerely yours,

Richard C. Leone
Chairman

Stanley Brezenoff
Executive Director

cc: Honorable David N. Dinkins
Mayor
City of New York
City Hall
New York, N.Y. 10007

Honorable Norman Steisel
Deputy Mayor
City of New York
City Hall
New York, N.Y. 10007

Honorable William F. Feehan
Deputy Commissioner
Fire Department - City of New York
250 Livingston Street
Brooklyn, N.Y. 11201

Chief Anthony L. Fusco
Chief of Department
Fire Department - City of New York
250 Livingston Street
Brooklyn, N.Y. 11201

Chief John J. Hodgens
Chief of Bureau of Fire Prevention
Fire Department - City of New York
250 Livingston Street
Brooklyn, N.Y. 11201

bcc: A. DiNome, E. Fasullo, W. Goldstein, J. Green, L. Righter Sloan

The City of New York

FIRE DEPARTMENT
250 LIVINGSTON STREET BROOKLYN, N.Y. 11201-5884

CARLOS M. RIVERA
Fire Commissioner

ATTACHMENT E

TO: **David N. Dinkins**
Mayor

FROM: **Carlos M. Rivera**
Fire Commissioner

Rudolph J. Rinaldi
Commissioner of Buildings

DATE: March 25, 1993

Attached please find a Report entitled "Fire and Building Codes and the Jurisdiction and Compliance of Federal, State, State Authorities and Foreign Government Buildings," which was requested by First Deputy Mayor Steisel after the explosion at the World Trade Center on February 26, 1993. We will continue to keep you apprised of the City's efforts in monitoring the recommendations contained in this report.

cc: Norman Steisel, Deputy Mayor
Fritz Alexander II, Deputy Mayor
O. Peter Sherwood, Corporation Counsel
Gordon Campbell, Deputy Director, Mayor's Office of Operations

REPORT

Fire and Building Codes and the Jurisdiction and Compliance of Federal, State, State Authorities and Foreign Government Buildings

Dated: March 25, 1993

Carlos M. Rivera
Fire Commissioner

Rudolph J. Rinaldi
Commissioner of Buildings

INTRODUCTION

Following the explosion at the World Trade Center on February 26, 1993, First Deputy Mayor Steisel requested a report from the Fire and Buildings Commissioners addressing the following matters:

- Buildings and Fire Departments' Jurisdiction and Enforcement Authority p.1
- City Jurisdiction over Federal, State, State Authorities and Foreign Government Buildings p.3
- Current Agreements with Entities Not Subject to the City's Jurisdiction
- Code Compliance at the World Trade Center p.6
- Recommendations

The following report sets forth our findings to date.

BUILDINGS AND FIRE DEPARTMENTS' JURISDICTION AND ENFORCEMENT AUTHORITY

The Buildings Department (DOB) reviews plans for new buildings and alterations to assure compliance with Building Code and Zoning requirements. As part of that review, DOB examiners insure that plans comply with fire safety features, particularly those required by Local Law 5 of 1973 and Local Law 16 of 1984. For existing buildings under its jurisdiction, DOB tracks compliance with fire safety measures in Local Laws 5 and 16 to ensure that retrofitting has been accomplished.

In general, under Local Law 5/73, existing high-rise office buildings (over 100 feet tall) had to install the following:

- Fire Alarm Communication System (FACS)
  - Fire Command Station
  - Alarm (gong, bell, speaker)
  - Fire alarm pull box by each exit way on each floor
  - Speaker for communication from fire command station to any floor
- Elevator-in-Readiness (EIR)
  - At fire signal all elevators descend to the ground floor automatically and remain there
  - Only fireman key will operate elevator
- For centrally air conditioned buildings only, install <u>one</u> of the following:
  - Sprinkler throughout
  - Stairwell pressurization (fans blow air from outdoors into stairwell) and compartmentation (Fire-rated (1 hour) partitions dividing all floor areas in sections or compartments of 7,500 square feet or less).

Local Law 16/84 added the following safety requirement for existing high-rise office buildings:

- Emergency powered exit lights and signs (either battery pack or alternate power source)

All new high-rise office buildings must be fully sprinklered and have smoke control systems. In addition to office buildings, Local Law 16/84 extended fire safety requirements on a selective basis to several other categories of buildings, including institutions, hotels, mercantile establishments, and industrial buildings. As a result, Local Law 16/84 covers approximately 22,000 buildings.

There are 800,000 buildings in New York City. DOB inspectors are utilized to respond to 35,000 safety and zoning complaints annually, and inspect approximately 100,000 jobs which have been filed with DOB for code compliance. In some of the more critical life safety areas, periodic inspections are required by the Building Code. For example, the Code requires periodic elevator inspections by DOB inspectors. Facade and boiler inspections must be filed with DOB by licensed professionals on behalf of building owners. However, DOB inspectors do not perform periodic inspections of the 800,000 buildings in the five boroughs.

In addition to its firefighting and other emergency response jurisdiction, the Fire Department is responsible for inspecting and recommending approvals for, among other things, highly complex and sophisticated fire and voice alarm and communication systems in office buildings, hotels, hospitals, schools, nursing homes, shelters, colleges and universities. It issues permits and conducts a variety of fire safety inspections, including witnessing tests of standpipe and sprinkler systems in high-rise office buildings. The Hi-Rise Unit of the Fire Department's Bureau of Fire Prevention performs inspections at office and hotel buildings and administers on-site examinations to certify fire safety directors. Hi-Rise Unit inspectors also conduct inspections under Local Laws 5 of 1973 and 16 of 1984 with respect to Fire Safety Directors, Class "E" Alarm Systems, Fire Safety Plans and Fire Command Stations.

The Fire Department has general enforcement jurisdiction over the Fire Prevention Code and has limited concurrent jurisdiction with DOB to enforce certain sections of the Building Code. Where certain violations are found, the Fire Department issues Notices of Violation which are returnable before the Environmental Control Board and for other violations, summonses are issued which are returnable before the Criminal Court. In the usual case, the issuance of a Violation Order which provides the respondent with a certain time period for correction of the defective condition, precedes the issuance of a summons; a summons is only issued where no correction is made.

CITY JURISDICTION OVER FEDERAL, STATE, STATE AUTHORITIES AND FOREIGN GOVERNMENT BUILDINGS

Buildings owned by the federal or state governments or by state-created entities are not subject to the City's Fire Prevention and Building Codes, unless provided for or authorized by statute. For example, the School Construction Authority is required by statute to comply with local codes. In contrast, state legislation provides that New York City codes will apply to the World Trade Center (WTC) only if an agreement signed by the Port Authority with the City so provides. State law also provides that local laws will apply to the Urban Development Corporation (UDC) and its subsidiaries unless the UDC or its subsidiary determines that such compliance is not feasible or practicable.

Jurisdiction over foreign government-owned property in the United States is vested in the Office of Foreign Missions ("OFM"), which is within the United States Department of State. Federal legislation exempts from preemption any local law regarding, inter alia, land use, health, safety or welfare. It has been the practice of the OFM to so advise such governments; however, at the present time, there appears to be a dispute between the United States Mission to the United Nations and the OFM as to whether such compliance is required. As a result, we have asked the Law Department to examine this question.

CURRENT AGREEMENTS WITH ENTITIES NOT SUBJECT TO THE CITY'S JURISDICTION

a. Formal Agreements

The Fire Department's Bureau of Fire Prevention has entered into a number of formal agreements, e.g., memoranda of understanding, with the following entities:

1. "Protocol for Periodic Joint Port Authority/Fire Department of New York Inspections of Port Authority New York City Facilities" signed by former Commissioner Bruno on November 4, 1988: provides for Fire Department evaluation of fire protection at various sites selected by the Port Authority; Port Authority is exempted from paying inspectional and permit fees.

2. "WTC/FDNY Joint Protocol for Inspectional Activity at the World Trade Center Complex," signed by former Commissioner Spinnato on September 2, 1986: key aspects are that a) the Fire Department is allowed to inspect and issue advisory inspectional reports, b) Fire Department is allowed to test fire safety directors at the WTC on the service equipment and fire safety plan, although the Fire Safety directors are not mandated to obtain Certificates of Fitness from the Fire Department, and c) WTC is exempt from all inspectional and permit fees.

3. "Fire Department, City of New York/ New York City Transit Authority Joint Report to Mayor Dinkins Regarding Fire Safety in the New York City Transit System": contains procedures for emergency response by Fire Department to Transit Authority subway system sites.

4. "Agreement Between the New York Power Authority and the Fire Department of New York City concerning the Joint Inspection of the Charles Poletti Power Project": Fire Department is permitted to inspect and issue advisory inspectional reports.

5. "Agreement between the United Nations and the Fire Department of New York City concerning Joint Inspection of United Nations Firefighting Equipment and Facilities": Fire Department inspects and issues "confidential report of its findings and recommendation for desirable corrective action." United Nations exempt from inspectional and permit fees.

6. "Agreement between Metro-North Commuter Railroad Co. and NYFD for fire safety procedure on the railroad's property in NYC": commitment to provide Fire Department with information vital to responses to track emergencies; and to retain engineering firm to submit comprehensive analysis of its fire prevention and alarm systems and make recommendation for total compliance with the City's Fire Prevention Code.

7. "Memorandum of Understanding between the New York City Fire Department and the New York State Department of Environmental Conservation": establishes uniform procedure for response to petroleum discharge incidents in New York City and for Fire Department obtaining reimbursement for its cleanup costs.

Although all of the above agreements are in force, it should be noted that the agreements with the United Nations and the New York Department of Environmental conservation were never formally signed by the parties.

b. Informal Agreements

Informal arrangements have been developed with several Federal, State and State Authorities locations within the City whereby Fire Department personnel visit these locations for the purpose of conducting fire safety inspections. For example, the Fire Department has been allowed to conduct regular inspections at the New York State Office of Mental Health at 50 Nevins Street in Brooklyn, the New York State General Services Administration Building at 60 Centre Street in Manhattan and the United States General Services Administration Building at 26 Federal Plaza in Manhattan. The Fire Department also responds to complaints received concerning these locations and, if granted access, performs a fire safety inspection. If violations of the Fire Prevention Code are found, the Fire Department will issue letters listing fire safety defects (violations). Since the Fire Department has no enforcement powers in these occupancies, follow-up of violations is made by sending correction letters. However, response from these agencies to Fire Department letters of defect has been poor.

CODE COMPLIANCE AT WORLD TRADE CENTER

a. History

The history of Fire Department involvement with fire prevention and protection at the WTC began with the origin of the WTC project in the mid-1960's. Over the years, the Fire Department exhorted the Port Authority to improve the fire safety in these towers. Between 1974 and 1978, numerous meetings were held between high level officials of the Fire Department and the WTC concerning modification of the WTC Towers to comply with Local Law 5 standards. The result of this was that a timetable was set by the WTC for bringing the towers into compliance. While significant progress has been made, there has not been total compliance to date.

After several major fires in the 1970's, the Fire Department in 1975 testified at the City Council for the need to have jurisdiction over this complex as well as other buildings owned by public benefit corporations, again particularly for Local Law 5 compliance. As a result, the City Council forwarded a Resolution dated August 29, 1975 to the State legislature. (See Attachment I). Proposed legislation which would have granted City agencies jurisdiction was introduced in the State legislature over the years; the State has not enacted such legislation.

It is important to note that, in regard to the Port Authority, the trend in recent years has been towards cooperation. Most importantly, a program to fully sprinkler the Tower buildings began in the mid-1980's and is nearly completed in Tower 2 and approximately 85% complete in Tower 1.

Prior to the February 26, 1993 explosion, the Fire Department acted pursuant to the joint protocol for inspectional activity at the WTC which was signed in 1986. The PA's policy was to voluntarily cooperate with the Fire Department "to the fullest extent practicable". Fire Department representatives met continually with PA officials to discuss problems with the WTC's emergency procedures and fire safety equipment. Generally, the PA was cooperative and verbally informed the Fire Department that it was their intent to fully comply with Local Law 5. However, since its compliance with fire code requirements was dependent upon economic and design feasibility, the PA agreed to comply with selected provisions of the code, but has not fully done so. Moreover, it was difficult for the Fire Department to monitor code compliance by the WTC because the WTC consistently asserted its legal exemption from local law. Fire officials relied on persuasion and negotiation to gain compliance. The extent of these negotiations is reflected in the voluminous WTC files

maintained at the Fire Department. Code compliance at the WTC has been dealt with by every Fire Commissioner and Chief of Department over the last twenty-five years.

b. Compliance at Time of Explosion

The fact that the WTC may have been constructed to codes other than New York City codes does not mean the WTC is or was unsafe. The codes followed at the WTC certainly had safety factors built in. While not exactly duplicative of City codes, they may have had equivalencies or even exceeded local codes.

A preliminary review by DOB generally indicates that the WTC complies with the specific fire safety requirements of Local Law 5/73 and Local Law 16/84, or provides acceptable equivalent systems.

In fact, in several areas the WTC exceeds the requirements of these local laws. For example, the New York City Building Code requires that emergency power to exit lights and exit signs be on separate circuits ahead of the main switch. At the WTC, such power is provided by separate feeders as well as emergency generators. Similarly, smoke shafts or stair pressurization are not required by the Building Code where an office building is sprinklered. The WTC is not only 85-95 percent sprinklered, but also has smoke purge and corridor pressurization systems in place. Again, while emergency power in existing buildings is not required under Local Law 16/84, emergency power is provided at the WTC.

The major departure to our knowledge from the requirements of Local Law 5/73 and Local Law 16/84 is the fire alarm system. For example, each building at ~~the WTC does not~~ have its own fire command station, ~~has only one pull station on~~ each floor and does not provide public address to all areas of all floors.

The following chart provides a general and preliminary comparison between the major system requirements of Local Laws 5/73 and 16/84 with the conditions in place when the explosion occurred:

	Type of Work Code Section	Compliance
1	Compartmentation Sec. 504.1 (c)	Not required in sprinklered buildings.
2	Smoke shaft or stair pressurization Sec. 504.15 (c)	Not required in sprinklered buildings. However smoke purge and pressurization of corridors with 100% fresh air is provided
3	Emergency power exit lights Sec. 605.2 (b)	Exceeds requirement. Required - On separate circuit ahead of main switch Provided - Separate feeders and emergency generators - Note "A"
4	Emergency power exit signs Sec. 606.2 (b)	Exceeds requirement. Required - On separate circuit ahead of main switch. Provided - Separate feeders and emergency generators - Note "A"
5	Stair & elevator signs Sec. 608.0	Yes.
6	Emergency power Sec. 610.0	Exceeds requirement. Required - None. Provided - See note "A" above
7	Sprinklers Sec. 1703.1	Yes 95%} completed for one tower 85%} completed for other tower

	Type of Work Code Section	Compliance
8	Class "E" fire alarm signal system Sec. 1704.5 (f)	Yes - But air supply and exhaust air to fire floor are not closed off when sprinklers are activated. Note: equivalent system provided by item #2 above and smoke detectors at fans, which stop fans.
9	Fire command & communication Sec. 1704.8	Yes - except that each building does not have its own fire command station
10	Elevator in readiness Sec. 1800.8 (b)	Yes - See note "A" above
11	Removal of locks on elevators & hoistway doors Sec. 1801. 4	Yes
12	Firemen's service operation Sec. 1801.5	Yes - See note "A" above

The Fire Department's most recent inspection revealed the following defective conditions:

1. failure to have certified fire safety directors;
2. failure to have available information identifying fire wardens and deputy fire wardens;
3. failure to have exit stairs properly identified;
4. failure to have an organization chart for fire drill and evacuation assignments on each floor; and
5. failure to have fire safety plans and floor plans available at the Fire Command Station.

c. Reopening

The Fire Department has worked closely with the Port Authority to re-open the World Trade Center. It is important to note that the basic fire protection systems have been restored to full operation. For example, the sprinkler, standpipe, emergency power, fireman service, elevator and alarm systems, that were in existence on the day of the explosion, were restored to service prior to re-opening. In addition the WTC has agreed to provide, among other things, the following enhancements:

1. a modernized Class E fire alarm communications system;
2. an expanded public address system to tenant spaces;
3. air-cooled backup emergency generators in mechanical equipment rooms and on roofs of plaza buildings;
4. battery pack lights in elevator machine rooms and local elevator banks on main lobby/sky lobbies;
5. emergency power to smoke purge fans and increased cubic feet per minute capacity; and
6. magnetic re-entry locks which can be remotely released or automatically released in a power failure.

In addition, the Port Authority has proposed an enhanced Code compliance protocol, as evidenced by the attached letter dated March 19, 1993, from Stanley Brezenoff, Executive Director at the Port Authority to Commissioner Rivera. (See Attachment II).

RECOMMENDATIONS

The explosion incident highlights the fact that the City cannot ensure that many buildings in New York City owned by other government entities comply with New York City's Fire Prevention and Building Codes. Buildings that fail to comply with New York City Codes do not provide standard fire protection features for the fire fighting forces and standard fire safety for the occupants. Building construction as well as the fire safety systems installed may be significantly different than NYC code buildings.

All buildings in New York City should be built to codes that reflect the technical expertise and equipment capabilities of the City enforcement agencies. Firefighters and Buildings inspectors have to know what to expect when going into a building, either to inspect systems or to utilize them when fighting fires or responding to other disasters. For example, it is vital to know whether a fireman's key works in elevators in buildings not under the City's jurisdiction.

The specifics of fire safety requirements are developed not only in terms of public safety, but reflect the nature of the equipment used by the Fire Department in extinguishing fires. For example, the definition in the Building Code of a high-rise office building is determined by the length of ladders on fire trucks. Buildings over 75 or 100 feet (length of ladder) will require firefighting systems which buildings below these heights do not require.

In light of the foregoing concerns, the following recommendations are being made:

I. The City will seek Federal and State legislation to make all buildings comply with New York City Codes. The relinquishment of a government entity's regulatory exemption would only be meaningful if such relinquishment is permanent and irrevocable and includes consent to the jurisdiction of all New York Courts and administrative tribunals. Legislation to this effect will be drafted by the City's Corporation Counsel within 45 days.

II. Within the next 60 days, the City will be contacting all appropriate Federal, State Agencies and Authorities to gain their voluntary compliance with City codes for existing buildings and buildings under construction.

III. The City will establish a Code Committee to research and identify necessary changes. The Committee will focus on two issues. First, the existing codes were not created to take explosions and other terrorist actions into

consideration. At a minimum, the Code Committee will review which new requirements may be needed to prevent such a local explosion from incapacitating entire buildings. For example, the question of requiring remote locations for emergency generators, or other systems, would have to be examined. Trickle down emergency lighting and other factors would also have to be explored. Another area to be considered is requiring stair pressurization even in fully sprinklered buildings.

Second, it has been nearly a decade since the last comprehensive change was made in the City's Fire Prevention and Building Codes. Even though New York City Codes are generally recognized to be the most stringent in the nation, the Committee will review all fire safety areas of the Code to determine if there have been technological or design advances that would make buildings safer and/or whether conditions have changed since 1984 that would make systems not mandated in earlier code revisions necessary today.

The Fire and Buildings Departments recognize that the issues are complicated and that practical considerations such as the feasibility of retrofitting existing buildings have to be borne in mind when framing code changes. The Committee will be comprised of the Fire Department, Buildings Department, consulting engineers, building owners and managers, and others. A report regarding commercial buildings from the Committee will be provided by the end of the year.

CONCLUSION

The one lesson that can be learned from the February 26 explosion at the WTC is that all buildings in New York City should come under City codes. We pride ourselves that our codes are among the most stringent in the nation, and we have been in the forefront in applying technological advances to assure fire and structural safety in buildings. While the concept of supremacy for higher levels of government may have constitutional or political validity in many areas, it should be suspended where the lives and safety of people living and working in New York City are concerned.

X-3 UDC + Port Authority

Res. No. 436

Report of the Committee on Housing and Buildings in Favor of Adopting a Resolution Calling upon Other Jurisdictions to Require Public Benefit Corporations, such as the Urban Development Corporation and the Port Authority of New York and New Jersey, to Comply with New York City Code Regulations when Building in the City.

The Committee on Housing and Buildings to which was referred on February 21, 1975 (Minutes, page 436), the annexed resolution, respectfully

REPORTS:

This resolution calls upon the New York State Legislature in the case of the Urban Development Corporation and the state officials of both New York and New Jersey in the case of the Port Authority to have these Authorities comply with the New York City building regulations.

The Urban Development Corporation was created as a means of providing homes for families with low incomes. Under section 6266(3) of the Unconsolidated Laws the Corporation was to comply with local codes where it was feasible. Apparently U.D.C. has not deemed it feasible to meet the high standard that New York City has set for all new construction since it seems that there are numerous reports of items that would be violations if the City Building Code had to be adhered to.

Since the mandate given to the Corporation is not only to provide homes but these are to be "*safe and sanitary*," it seems to follow that the Corporation should meet the standard set for private builders.

Accordingly your committee recommends its adoption.

Resolution Calling Upon Other Jurisdictions to Require Public Benefit Corporations, Such as the Urban Development Corporation and the Port Authority of New York and New Jersey, to Comply With New York City Code Regulations When Building in the City.

Whereas, The New York State Legislature has created various public benefit corporations in order to promote the safety, health and welfare of the people of the State of New York; and

Whereas, Several of these agencies have come under public criticism in recent months for failure to fully meet these aims, namely the Urban Development Corporation and the Port Authority of New York and New Jersey; and

Whereas, The Urban Development Corporation was created to provide adequate, safe and sanitary dwelling accommodations and facilities for persons and families of low income; and

Whereas, The UDC was given powers designed to ameliorate existing problems of substandard, unsanitary, deteriorated and defective structures which have produced slum or blighted areas within the state; and

Whereas, In order to implement its goals, the UDC, like the Port Authority, was given the power to supersede any city-imposed building regulations it felt unwarranted such action; and

Whereas, In the opinion of recognized building experts the UDC and the Port Authority have been given autonomous judge and jury rules whereby they not only plan, finance and build, but also self-inspect such developments; and

Whereas, These agencies may and do ignore the city's Building Code, being responsible only for compliance with less stringent statutes; and

Whereas, One UDC housing project—the Twin Parks complex, located in the Tremont section of the Bronx—is presently plagued with numerous structural defects which pose serious threats to the health, welfare and safety of the tenants; and

Whereas, A common complaint in the 3,000 unit development is poor windows, more than 100 of which have fallen out, some onto the street posing a serious threat to passersby; and

Whereas, These poorly constructed buildings are adversely affected by heavy rains, causing serious damage in many of the apartments; and

Whereas, Some of these water leaks, because of the proximity to electrical panels, could cause death by electrocution; and

Whereas, Most of these conditions would not exist if the New York City building regulations had been complied with and city inspectors were allowed to supervise the structures as the building progressed; and

Whereas, The Port Authority's World Trade Center has come under similar criticism, most recently in the wake of a major fire which could have been contained had the structure been subject to city fire regulation; and

Whereas, In order that similar situations not be permitted to develop within the City of New York in the future, the UDC, the Port Authority and other public benefit corporations [illegible] New York City [illegible] therefore, be it

Resolved, That the Council of the City of New York calls upon the State

Attachment I

THE PORT AUTHORITY OF NY & NJ

One World Trade Center
New York, N.Y. 10048

Richard C. Leone
Chairman

(212) 435-4173
(201) 961-6600 x4173

C
3

March 19, 1993

Honorable Carlos M. Rivera
Fire Commissioner
City of New York
250 Livingston Street
Brooklyn, NY 11201

Dear Carlos:

Thank you again for all of your assistance, and the efforts of all of New York's Bravest, in assisting the Port Authority to address the explosion and fire at the World Trade Center on February 26, 1993 and its aftermath. The dedication and professionalism of the Fire Department are deeply appreciated by all of us at the Port Authority, and all who were affected by the events of that day.

Although the events of February 26 were truly extraordinary, there was nothing out of the ordinary in the high level of cooperation between our two agencies. Our agencies have cooperated in the past in responding to other emergencies, at our New York airports and other facilities. Our agencies have also cooperated in the less conspicuous, but equally important, day-to-day efforts of maintaining Port Authority facilities as safe places to work in and visit.

The continuing spirit of cooperation between the Port Authority and the Fire Department is embodied in long-standing Port Authority policies to conform with New York City fire code requirements, and in protocols between the Port Authority and the Fire Department. Consistent with the philosophy of these policies and protocols, all Port Authority facilities in the City of New York have been available for inspection by the Fire Department.

As we discussed, we will be submitting a resolution to the April 15 meeting of the Board of Commissioners under which the Port Authority would voluntarily agree to implement all findings for the improvement of safety systems and procedures made by the Fire Department based on such inspections. In addition, any safety systems to be introduced or added to the World Trade Center will first be reviewed with the Fire Department.

We are convinced that through such continuing cooperation we can best serve out joint interest in protecting the health and

Attachment II

safety of those who work in and visit Port Authority facilities located in the City of New York.

Again, thank you for all of your assistance and the efforts of the entire Fire Department.

Sincerely yours,

Richard C. Leone
Chairman

Stanley Brezenoff
Executive Director

cc: Honorable David N. Dinkins
Mayor
City of New York
City Hall
New York, N.Y. 10007

Honorable Norman Steisel
Deputy Mayor
City of New York
City Hall
New York, N.Y. 10007

Honorable William F. Feehan
Deputy Commissioner
Fire Department - City of New York
250 Livingston Street
Brooklyn, N.Y. 11201

Chief Anthony L. Fusco
Chief of Department
Fire Department - City of New York
250 Livingston Street
Brooklyn, N.Y. 11201

Chief John J. Hodgens
Chief of Bureau of Fire Prevention
Fire Department - City of New York
250 Livingston Street
Brooklyn, N.Y. 11201

ATTACHMENT F

STATEMENT BY STANLEY BREZENOFF, EXECUTIVE DIRECTOR
THE PORT AUTHORITY OF NEW YORK & NEW JERSEY
BEFORE THE NEW YORK CITY COUNCIL
COMMITTEE ON HOUSING & BUILDINGS

NEW YORK CITY
MARCH 26, 1993

Good morning, Mr. Chairman, committee members and guests. I am Stanley Brezenoff, Executive Director of the Port Authority of New York and New Jersey. With me are Eugene Fasullo, our Chief Engineer, and Charles Maikish, Director of the World Trade Department.

On February 26th, at 12:18, beneath the World Trade Center, a bomb exploded with the force of fifteen hundred pounds of dynamite. Six people were killed in the blast – four Port Authority employees, an employee of a contractor active in the complex for many years, and a visitor to the Trade Center. More than a thousand suffered injury, mostly from smoke inhalation.

Since that day, we have been working around the clock to get the World Trade Center reopened and have been taking immediate steps to re-establish and enhance life safety and security features in the complex. With the cooperation of the New York Fire Department, the Plaza buildings, PATH and much of the retail concourse were back in operation within days of the blast, and we worked out safe, but very limited, access for tenants to remove material from their tower offices needed to set up interim operations elsewhere.

The move back into Two World Trade Center, begun by Governor Mario Cuomo a week ago, is nearing completion. This week we announced the start of move-ins back into One World Trade Center, the tower that took more smoke and some damage to its main lobby. All the other buildings and services in the complex except the Vista International Hotel and subgrade parking are approaching normal operations, with additional security measures where necessary.

Things are getting back to normal for our tenants, but our world changed on February 26th. We have been analyzing what happened, and how to apply the lessons of this terrible incident to enhance security at the World Trade Center and other Port Authority facilities. Other building managers are doing the same around town and around the nation. For the Port Authority, this will be an ongoing process that will involve our police and other law enforcement officials, outside experts, our Board of Commissioners, and our tenants.

The Council's inquiry is important and welcome. We should not fail as a nation to reconsider in light of the bombing what measures are needed to safeguard the public while sustaining our ability to function in as a free society. The issue is especially pertinent in New York City, whose skyscrapers and attractions are symbols of the United States recognized the world over.

We have offered our full cooperation to the Council in responding to your inquiries on fire safety and code issues. The bombing presents us with a dramatic example of how a major incident can overwhelm even the extensive precautions -- within and beyond local codes -- that were "on-line" at the World Trade Center on February 26th.

I will review --

- What happened on February 26th, and how the massive impact of the blast affected the extensive emergency systems that have functioned well in past incidents;

- How we have responded: reconstruction, repair of life safety systems, and development of interim and permanent safety and security system additions with the guidance of the New York Fire Department;

- What code compliance and fire safety measures the Port Authority had taken through the years, substantiating the Fire Commissioner's recent confirmation that the World Trade Center was and is fire-safe in its structure and operations;

As you know, one of the measures the Port Authority has taken is to voluntarily place all our facilities under the jurisdiction of the New York Fire Department and its counterparts in other communities that host our facilities, with respect to the implementation of all findings for the improvement of safety systems and procedures based on their inspections. This broadens our existing protocols with the New York Fire Department and others, which already made our facilities subject to inspection and required us to respond to any problems cited in fire safety inspections.

Like other state and federal agencies, we have not been covered by local codes. However, it has been agency policy for many years to meet or exceed local code requirements wherever practicable. Where local codes do not cover the special character of some of our facilities, we have worked with fire officials to establish protocols and also used nationally recognized fire safety standards. My action last week is intended to remove any doubts about the Port Authority's responsiveness to local fire departments in ensuring public safety.

There's no way to undo the loss of life or the fear and pain many suffered that day, but the Twin Towers withstood the explosion without damage to their structural integrity. I am proud of the efforts of so many Port Authority people and other public servants and contractor employees who have toiled night and day since February 26th to get the complex back in operation.

Though the Port Authority offices in One World Trade Center will be among the last to be re-opened, the sight of workers returning to the towers is especially welcome to those of us -- including Gene, Charlie, and me -- who were among the estimated 40,000 people in the towers at 12:18 that Friday afternoon.

The blast occured on the second sub-level, the B-2 level of the complex, centered on a vehicle ramp below the Vista International Hotel adjacent to One World Trade Center, the North Tower. The explosion's immediate impact blew up through the floor of an anteroom of the Vista ballroom and blew out glass between that space and the tower lobby. The downward force of the blast demolished the B-2 level, and other subgrade areas, with debris falling down onto the complex's cooling system on the B-5 level. The blast blew down a wall over the PATH turnstile concourse on the B-3 level, showering debris on this area.

The explosion also blew out the concrete block walls of five elevator shafts in the North Tower. Though the subsequent fire was confined to the subgrade areas, the opened shafts created a flue for smoke to rise quickly up the tower.

The initial blast ripped through all major utility systems for the complex: fire standpipes leading into the towers, commmunications lines, and five of the eight main feeder lines for Con Edison power. The remaining three continued to provide some electricity to the complex until they were shut off at the fire department's request to facilitate the firefighting operation. Also heavily damaged were the Port Authority police station, and the Operations Control Center -- the nexus of our smoke and fire alarm and emergency communications systems.

Emergency generators on stand-by to power key fire safety systems, emergency lighting, and elevator evacuation operations did kick in, but shut down shortly afterward because the explosion had cut off the pipes that provide their cooling water. In addition, water from broken standpipes and the firefighting operation flooded the emergency generator room to a depth of eighteen inches.

I should emphasize that our primary power feeders and these generators are separated by three floors of concrete and are at the opposite ends of the blast site.

The damage caused by the explosion knocked out our systems for communicating with people in the towers,. Detecting the presence of smoke, and without knowing that there was no fire in the towers, many immediately began making their way down the stairwells. With the destruction of both the primary and secondary means of powering life safety electrical and communications systems, our system for venting smoke from the towers, and the loss of the control center itself -- along with injuries to the operations staff on duty there -- our oft-rehearsed emergency evacuation procedures could not be implemented.

New York City and Port Authority police, firefighters, and EMS personnel responded very rapidly. The actual fire was confined to the subgrade, and mostly involved automobiles in the basement parking areas near the site of the explosion. Search, rescue and treatment of individuals who were in the subgrade areas at the time of the blast commenced immediately.

At the same time, police and firefighters began making their way up the tower firestairs. Despite the destruction of key emergency response systems, those in the towers were safest if they stayed in their offices – the usual advice in high-rise fire or smoke situations – but they couldn't know that because we could not communicate with them. Firefighters and City and Port Authority police performed heroically, working their way up darkened stairs and assisting workers to safety, as well as removing people trapped in elevators.

Just as much courage and coolness under pressure was demonstrated by the thousands of workers in the complex. As one of those caught in Tower One, I was moved by the spirit of fortitude and selflessness shown by many people in reassuring and assisting each other in the difficult hours until all had reached safety.

Meanwhile, restoration of building systems was begun immediately by operating personnel who literally had dragged themselves out of the rubble of the subgrade and went right back to work. The towers stood fully lighted that evening.

As everyone was evacuated from the towers, Port Authority Police secured the complex, and within hours of the explosion, the first teams of structural engineers, fire department and criminal investigators began to explore the subgrade to find the cause and assess the damage.

What they found was truly staggering. Though the structural integrity of the towers was quickly affirmed, the scale of blast damage was far beyond any explosion that might be expected from mechanical or vehicular mishaps, or experience with terrorist bombs.

As some of the Council members have seen first-hand, the explosion blasted out a cavern around the complex's vertical steel support columns that penetrates five basement levels and the Vista and spans 80 to 120 feet on some levels. Now that more than 2,500 tons of debris has been removed, you can peer into a space that some reporters have called a "Grand Canyon of destruction."

In cooperation with the Fire Department and the criminal investigation team, the Port Authority mobilized more than a thousand of its own employees and workers from construction and engineering firms and other experts, including environmental specialists. The recovery effort began immediately.

Just hours after the blast, an environmental monitoring team descended into the subgrade area to take air samples for asbestos and other potentially hazardous materials. They placed the first of a number of air monitors from which the initial samples were helicoptered to laboratories for analysis on the night of the blast. Continuous monitoring since that evening has revealed no cause for concern to workers or neighbors from asbestos or other pollutants.

Vertical columns stripped of their horizontal supports were braced. Damage to utility systems was assessed, open lines capped, and repairs commenced. The recovery process was coordinated closely with law enforcement officials, to provide safe access as quickly as possible to the blast site and support the recovery of material needed for the criminal investigation.

A great emotional burden through these days was our inability to locate Wilfredo Mercado, the Inhilco employee reported missing shortly after the explosion. Painstaking searches by construction workers and police, including frequent use of trained police dogs, were made repeatedly until his body was located early last week. He had been buried under tons of debris.

As services came back on line and back-ups were established, we were able, with the cooperation of the New York Fire Department, to restore operations for many activities around the complex outside the towers and the hotel. I can't emphasize too much the debt of gratitude we and our tenants owe the Fire Department, not just for its response to the initial explosion and fire, but in guiding us and helping us to begin bringing this complex back to life without compromising public safety.

By Monday morning, we were able to reopen the commodities exchanges in Four World Trade Center, which play a critical role in national and international markets. There was resumption of commercial operations in Five World Trade Center and retail operations on the Concourse east of the escalators to PATH. Thanks to extraordinary efforts by PATH workers, service was restored for the Monday morning rush after

weekend tests to determine whether vibration levels posed a risk in the damaged subgrade areas. Subway service to all stations in the complex was restored within a few days.

Within two days of the explosion, we began with the fire department's supervision, providing limited access for the 350 business tenants in the entire complex to remove the materials critical to their resuming operations elsewhere. Up to 50 radio-equipped Port Authority staff members escorted up to 300 trips on some days.

City and State officials, the New York Telephone Company, Teleport Communications, and others worked energetically with Port Authority staff to meet the most critical needs of our tenants and their employees. Hotlines, computer message services, emergency loan assistance and other aids were made available.

We have kept most of these services available for tenants who need them. I want to acknowledge the great cooperation of the City government through these past weeks in meeting the needs of tenant companies and their workers. Staff from the Department of Business Services, the City's Economic Development Corporation, and Department of Employment staffed desks in our tenant services center. The Department of Mental Health coordinated stress counseling for workers requesting this assistance.

Debris removal and reconstruction activity has been proceeding steadily in the subgrade areas. The debris itself is also being sampled for asbestos. Concrete is being taken to recycling plants and other material is being taken to licensed landfills.

Depending on the pace of subgrade repairs and other work, reopening of the Vista Hotel is expected by mid-summer. Public services and other activities in the complex are essentially back to normal, as the move-back into the towers continues.

There is truth, but little comfort, in the observation that nearly any other building rocked by a bomb of this size probably would have suffered crippling structural damage and much greater loss of life. The effect on the buildings' mechanical and electrical systems below grade was severe, but the towers had no loss of structural integrity, and damaged supports under the Vista were braced quickly.

We were well served that day by the Port Authority's tradition of designing for high standards of structural integrity, and our policy of voluntarily meeting or even exceeding code requirements. For the World Trade Center, this meant an exceptionally strong and innovative structure with additional safety features, and ongoing modernization, including extensive work to comply with the mandates of Local Law 5, the landmark high-rise building fire safety law passed by the New York City Council in 1973, after the complex opened.

This is why Fire Department officials have been able to say that the World Trade Center was and is a fire-safe complex. I want to review some details and then discuss what we are doing beyond what the law requires to strengthen World Trade Center fire safety and local fire departments' oversight over all our facilities.

The World Trade Center was designed and built to comply with --

- The New York City Building Code of 1968
- The New York City Electrical Code
- The New York City Fire Prevention Code, to the extent that it covers such items as large refrigeration plants, welding operations, storage of matches, etc.
- The New York City Health Code, as it applies to food preparation areas
- The New York State Labor Law, in areas such as window washers.

0 From the standpoint of structural integrity, the World Trade Center towers were built to meet or exceed the building code standards of the time. Examples include --

- the towers have three stairs for fire egress, rather than two required by code
- the towers comply with or exceed code provisions controlling fire protection of structural members, floors and partitions, and enclosure of shafts
- the office floors can support 100 pounds/square foot, twice the code requirement
- the towers were designed for wind speeds approximately twice those in the code.

0 The towers include many features beyond existing fire safety standards, with designs reviewed by the Fire Department. Examples include --

- prohibiting PVC insulated power wiring and pipes
- requiring fire dampers in penetrations of all fire-rated construction, even when exempted by the Building Code for one-hour partitions
- developing guideline specifications to limit combustibility of drapery and upholstery, as well as carpeting
- developing ceiling suspension designs to enhance fire safety

0 The agency undertook extensive efforts to meet the requirements of Local Law 5, the high-rise fire safety law passed in 1973, after the complex opened. For example, 95 per cent of the World Trade Center is sprinkler-equipped. With 110 floors in each tower, all but 17 occupied floors are sprinklered. Sprinklerization of five of these is now in process, as special cirumstances, generally the need for asbestos removal, are addressed on these floors. Local Law 5 allows sprinklerization as an alternative compliance option to pressurization of stairwells, which the Port Authority also evaluated and determined to be ineffective for the towers. Development of decentralized fire safety stations for the complex, in addition to a centralized operations control facility, is under way to fulfill current fire department requirements. The Vista Hotel and Seven World Trade Center, built after passage of Local Law 5, have their own fire command centers.

Consistent with the standards established in Local Law 5, the World Trade Center includes an interior alarm and two-way communications system, a safety plan, and separation of floors and vertical passages to prevent the spread of fire and smoke. In addition, the elevator system exceeds code requirements by having all of its elevators available for recall and capable of operation on emergency power.

0 Before the bombing, the Port Authority had in place systems of smoke alarms, fire alarms, emergency communication, and smoke purge, along with back-up generators for the most critical functions. These systems functioned well through previous fires in the towers themselves, blackouts involving the loss of Con Edison power, and the December Nor'easter that stymied PATH, most City subways, and other public

facilities. These were proven systems. It was the magnitude of the bomb that complicated the evacuation -- which was nevertheless accomplished without additional loss of life in the towers or serious injuries. We can only speculate whether any other structure could have withstood so massive an explosion as well as the World Trade Center.

0 The Port Authority and the New York Fire Department have in place firefighting protocols for the World Trade Center and all our other New York City facilities. Those protocols subject our facilities to Fire Department inspection, and obligate us to respond to any areas identified as needing improvement. As with other buildings, Fire Department inspections have raised technical issues, which we are working to resolve. Like other federal and state agencies, the Port Authority is not covered by local codes. As I have noted, it is our longstanding policy to comply wherever practicable. However, to eliminate any doubt about our commitment to the highest standards of fire safety, we have written Fire Commissioner Carlos Rivera to advise him that we are voluntarily placing all our New York City facilities under the Fire Department's jurisdiction. We have taken similar action for our New Jersey facilities. we will ask our Board of Commissioners to make this agency policy at our next Board meeting on April 15th.

Last month's bombing forces us -- and many others, I expect -- to reconsider what is prudent by way of redundancy in life safety systems and in security policy for a complex like the World Trade Center.

In terms of life safety, we have restored all the pre-existing systems I described a few minutes ago. In addition, we are taking the following steps above and beyond legal requirements in consultation with the New York Fire Department:

0 Installing back-up battery pack lighting and phosphorescent signs in stairwells and elevators -- we understand from the vendors that other building owners now are purchasing these lighting units as well.

0 Backing up the main electrical lines and emergency generators with additional air-cooled generators, which will be hooked up to provide

a third power source for emergency lighting, communications and elevator response, pending development of a permanent tertiary emergency power source.

0 Adding new communications and control stations in each "skylobby" of the towers, which will be staffed by fire department-trained fire safety directors equipped with two-way radios and other safety equipment.

0 Creating a new Vertical Security Patrol with two-way radios to monitor stairwells in the Twin Towers, as well as adding fire wardens at the elevator starter desks in each tower lobby.

There's more. The Port Authority's ongoing plan for improving the World Trade Center already included major projects to modernize and enhance life safety systems and other services that improve safety, security, and reliability of building systems. The five-year capital plan for the agency publicly released with our 1993 budget this past January summarized these plans. For 1993-97, the plan shows that nearly half of the more than $300 million allocated for the complex would go to safety and security projects.

One project well into planning and design is a new operations control system for the World Trade Center, which would employ a fiber optic network to connect key control points and mechanical and life-safety systems to an improved control center, as well as other decentralized stations within each building of the complex.

This decentralized capability will add an extra measure of safety in responding to any incidents in the future. We began planning this improvement two years ago, and the design is nearly completed. Construction was scheduled to start later this year. With the pre-existing system now restored and enhanced, we will review and accelerate plans for this new system with the advice and guidance of the fire department.

We are assessing other changes in building systems that would further reduce the Trade Center's vulnerability to any future attack in the nature of the February 26th bombing. I do not want to suggest that all or even most of these measures are necessary in all high-rise buildings or public complexes. However, after last month's assault, we are determined to take every practical precaution to safeguard the public,

while maintaining our character and function as an international center of trade and commerce and a key destination for tenants and visitors.

All the decisions about extra life safety measures are easy to make. Security policy presents us and others with much more difficult choices. Can we better safeguard the public against this kind of terrorist bombing without hobbling our ability to govern, to do business, and to conduct our lives in a free society?

The availability of public parking under the complex has been raised as a vulnerability, and, as we have acknowledged, possible parking restrictions were considered and rejected as part of a broader security review of the complex some years ago.

Hindsight is always 20-20. This facility is a hub of trade and commerce. The complex includes, in addition to the Tower offices, a hotel, restaurants, dozens of stores, and attractions for tourists and visitors, which are served with convenient access to public parking nearly everywhere. Even if I had decided to suspend public parking during the Gulf Crisis, it would have been restored long before February 26th.

It is now four weeks since the bombing. Five weeks ago, if I had been asked to ban public parking beneath the Twin Towers, in the absence of specific threat, I would have said no. Underground public parking was or is widely available in many high-visibility public structures and commercial complexes, as well as a host of office and apartment buildings around the city and elsewhere.

Looking ahead, our Chairman has noted that the future of public parking will be part of a wide-ranging review by the Port Authority and security consultants. It will be reinstated at the World Trade Center only if adequate security can be ensured.

As to our other facilities, security precautions are extensive and we are maintaining an elevated state of alert for future incidents in the wake of the World Trade Center attack. As with the precautions we took during Desert Shield and Desert Storm, we did not look back at prior efforts, but took steps based on the most current assessment of facility equipment and conditions and risks.

Managing security and other aspects of the World Trade Center is one of the Port Authority's most important roles on behalf of the states of New York and New Jersey. In addition to the direct and indirect employment and business activity attributable to the complex and its tenants, the World Trade Center last year provided nearly 40 percent of the Port Authority's net income, and a $38 million payment in lieu of property taxes to the City of New York. Revenue from the World Trade Center also supports the payout, together with interest over 30 years, of $400 million shared equally between the states to support regional development efforts. This is over and above other Port Authority commitments for our own facilities and other economic development projects.

The World Trade Center may have been a target because of the success that has made it recognizable around the world as a symbol of the United States and the global trading relationships that are shrinking the distance between people and cultures around the world. Getting it back on its feet quickly is a testament to the skill and dedication of government and private-sector workers who have made this region an unfailing source of renewal for the nation, and a symbol of freedom and opportunity for the world that no bomb can destroy.

Now, we must complete the process of renewing the World Trade Center and enhancing public confidence in, and acceptance of, the measures the region should take to protect public safety and our way of life in light of the bombing. I look forward to working with the City Council in that endeavor. The stakes could not be higher.

#